ECONOMIC ANALYSIS OF TOMATO PRODUCTION IN FAGGE LOCAL GOVERNMENT KANO STATE, NIGERIA

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Abstract
The study investigated the Economic Analysis of tomato production in Fagge Local Government Area of Kano state. Information on tomato production, management activities and problem encountered were collected from sixty seven (67) farmers selected through purposive and simple random sampling techniques. Double log Regression analysis and farm budgeting techniques were used to analyze the data. The result showed that, output was significantly influenced by farm size and labor at 5%while fertilizer had a significant relationship with output at 0.01% level of probability. The result further showed a Net farm income of ₦ 108,544.1 and Return on Naira investment of 1.5 per ha. Pests and diseases, insufficient capital, as well as high cost of inputs, were found to be the major problems of tomato production faced by the farmers in the study area. Some of these problems could be tackled through the provision of credit facilities and the farmers can also be encouraged to organize themselves into cooperative associations.

Keywords: Economic, Analysis, Tomato, Production, Fagge
JEL Classifications:

Introduction
Tomato is globally cultivated for its fleshy fruits and known as a protective food because of its special nutritive value and its wide spread production. It is the world's largest vegetable crop after potato and it tops the list of canned vegetables, tomatoes are eaten directly as raw vegetable or consumed in a variety of processed products like ketch-up, sauce, chutney, juice, diced, soup, paste, puree etc. It is a rich source of vitamin A and C, and also contains minerals like iron, phosphorus and is the richest source of nutrients, dietary fibers, antioxidant like lycopene and beta-carotene, the compounds that protect cells from cancer (Hobson, 1993).

The crop is a short generation time of about three to four months, well adapted to different cropping systems of cereal grains, pulses and oilseeds. Hence, it is the most widely grown vegetable crops grown worldwide under outdoor and indoor conditions. Agriculture in which horticultural practices are amongst contributes about 23.86% to 24.18% to the Nigerian G.D.P in the fourth quarter of 2014 (www.data.worldbank.org)

With the increase in diversification of the agricultural sector, there is also an increase in acceptance of the agricultural input such as fertilizer, pesticides, machinery, pest resistance and high yielding seeds among farmers, these made farm operations more efficient and productive But incomes from agricultural investment are still low. This is because there is a high cost of farm inputs and farmers also face various challenges such as drought, flood and various irrigation problems which added to the cost of production. It is with this concern in mind that this study embarked upon. Hence it aimed at assessing the profitability of tomato production in the study area.

The management of resources by farmers to cope with the increased demand for the food, fiber and exports crops is necessary. For farmers to remain in the business there must to be profit. One of the pre-requisites to this is through the estimation of input-output relationship relative to inputs prices, the rate of substitution and products prices (Chollum, 2013). Since tomato production entails different cost out lays, the farmers would want to know its profitability before venturing in to the production. This can practically be achieved through the knowledge of costing production and estimation of

benefits in monetary terms hence these prompted this research work. Additionally, the study exposed the problems associated with the tomato production investment and the recommendations aid in designing policies to mitigate the problems. Previous researches centered around improvement of production and productivity through the use new varieties and agronomic practices but assessment of the different cost outlays also play an important role in determining whether the farmers stay in the business or otherwise.

Literature Review

Tomato (*Lycopersicon lycopersci*), belongs to the family *Solanaceae*. It is the second most important vegetable crop in the world after potatoes is a tender warm season crop. The plants are typically vine, prostrate, and are either determinate, semi determinate or indeterminate based on whether the apical stem terminates in an inflorescence. Most shoots form in the axils of leaves. Tomato is an annual plant which can reach a height of over two meters (Naika et al., 2005).

Tomatoes are known to enrich some diet with nutrients including lipids, carbohydrate and vitamins (Komolafe et al 1980). Vegetable crops are important for almost every household. According to Dittoh (1992), vegetables add flavor to the food and also provide considerable protein, vitamins and minerals. Most vegetable are low in starch content and are a good source of phyto-nutrients. They serve as roughage, which promote digestion, and prevent constipation. Vegetable crops not only improve the nutritional quality of diets, the production of vegetables under irrigation and their marketing provides many people with employment in the dry season, it constitute a major component of the country's food sector. Vegetable occupies a significant position in the total per capita calorie intake of most Nigerians (Badmus and Yakini, 2011). It is estimated that about 70% of the vegetables produced in the Nigeria is marketed and consumed fresh. Dittoh, (1992) reported that dry season vegetable production in Nigeria has

become a booming business. Apart from the farmer and farm laborers who produce the vegetables, there are many people engaged in moving the produce from producer to the consumer.

The prospect of earning and maintaining profitability serves as the incentive for creativity and efficiency among farmers. Profitability stimulates farmers to venture into risky business and also drive them to develop ways of cutting cost and adopting new technologies always in an effort to satisfy consumer interest (Olukosi and Ogunbile, 1989). Profitable agriculture is dependent to a large extent on productive soil, plant variety, plant vigor, insect control and climatic condition. Apart from weather conditions production methods such as planting and cultivation determine the success of tomato production, early planting and cultivation provides good yield and high profit

Profit maximization is one of the important goals of farm business. Profit is generally described as the different between total revenue (TR) and total cost (TC). The total revenue is the product of output sold and the unit price while the total cost (TC) is divided by into fixed and variable costs. According to Olukosi and Ogunbile, (1989), fixed cost are those costs incurred on fixed inputs which cannot be used up during one production process, on the other hand, variable cost are those costs associated with variable inputs and do change with changes in output level.

Methodology
Study Area

Fagge Local Government is situated in the central part of Kano state, between the latitude 12°, 00"24'N, and $8^{o,}$ 31"45 E (http//:wikipidia.com). It is bordered by the Kano Municipal, Nasarawa, Dala and Ungogo local government areas. It has an area of $21km^2$ (8.1sqm) with apopulation of 200, 095 people and a projected population of 278, 300 in 2017. (NPC, 2006) The major ethnic groups are Hausa, Kanuri and Fulani. But it is inhabited by many people from other part of the country such as Yoruba, Igbo etc and neighboring countries such as

Ghana, Niger etc. (KNSG, 1999). The local government lies in the savannah region and is characterized by two (2) season namely dry and rainy seasons. The rainy season begins from April to September. This is cool and wet period with the average annual rain fall of 134.4mm. Majority of the inhabitants are civil servants, business men and women, tailors and mechanics while some engaged in cultivation of various crops, the climate of the area also favors the production cultivation of crops such as tomato, cabbage, lettuce and alike. KRA, (2000).

Kano state has been a commercial and agricultural State, which is known for the production of groundnuts as well as cereals. The state has more than 18684, square kilometers of cultivated land and is the most extensively irrigated state in the country (http//www.wikipedia 2010).

Sampling Procedure.
The sample of this study was drawn from tomato producers located at different parts of the Local Government Areas. A list of the tomato farmers were purposively selected and obtained from the commodity producing association of Fagge Local Government. Stratified random sampling was used to select seventy (70) tomato producers from the list. The breakdown of the respondents was as follows; Jaba 35, Alpha 25 and Kwakwachi 10. The selections were based on proportionate to size. Thus an area with high number of tomato producers received the large proportion of questionnaires.

Data Collection
Questionnaire supplemented with interview schedule were administered to seventy (70) tomato farmers in the selected areas. The data collected from the field were the primary data used for the research while other materials such as journals, textbooks and other related literature were the secondary data used in the research.

Analytical Techniques
Sixty seven (67) out of seventy (70) number questionnaires given out were received back. The data collected were analyzed using descriptive statistics, farm budgeting techniques (net farm income) and regression analysis.

Model specification
Descriptive statistics were used mainly for the assessment of constraints. This involved the use of frequency, percentage ranking.

Farm budgeting.
Farm budgeting is a detail of physical and financial plan for the operation of farm for a specific period of time with the objectives of comparing the profitability of alternative enterprises. Two techniques were used in farm budgeting, these are Gross Margin and Net Farm income analysis. The gross margin analysis is a technique for evaluating the performance of individual enterprises in the farm. The gross margin of a farm activity is the difference between the income earned and the variable cost (direct cost) incurred. It is the most commonly used measure in farm analysis and planning.

Gross margin is define as GM = GI-VC ……………………………………………… (i)

Where:
GM = Gross Margin
GI = Gross Income
VC = Variable Cost.

Gross margin analysis is used commonly when fixed cost in production process is considered as negligible.

Net Farm Income is define as NFI = GI – TC …………………………………………….. (2)

Where
GI = Gross Margin
TC=Total Cost
Total Cost = VC + FC
FC = Fixed Cost
VC = Variable Cost.

Similarly measures of farm performance that includes operating ration and gross ratio were determined as follows

Operation ratio (OR)
This was calculated by dividing the total operating (variable) cost by the total revenue.
I.e. OR = TVC/ TR

Fixed ratio (FR)
Fixed ratio was calculated by dividing the total fixed cost by the total revenue. i.e

Fixed ratio FR = TFC/TR

Gross ratio
The ratio of total cost to total revenue is the Gross ratio i.e.

Gross Ratio (GR) = Total Cost (TC) / Total Revenue (TR).

Depreciation of farm tools and equipment was calculated using straight line method. Depreciation = P – S/n

Where: P = Present value
                  S = Salvage
                  N = Expected life span of the asset

Results and Discussion
The finding of this study is presented in this chapter, tables are presented and discussion of the result is also presented and compared with other existing literatures.

Tomato Production Activities

Table 1: Source of Capital for Tomato production

Variable	Frequency	Percentage (%)
Source of Capital		
Personal saving	40	59.7
Loan	12	17.9
Family and friend	15	22.4
Farmland Ownership		
Purchase	14	21
Hired	19	28
Inherited	24	36
Gift	10	15
Size of Farmland		
0.1-1.0	28	41.8
1.1-20	27	40.3
>2	12	17
Labor Type		
Hired	24	35.8
Family labor	13	19.4
Both hired and family	30	44.8

Source: Field Survey (2018)

Capital acquisition is how the respondent sourced money for the purchase of inputs of the business. Table 1 showed the sources of capital to the tomato producers in the study area. Majority 60% of the respondents saved part of their personal income, 22.4% of the respondents sourced their capital from family and friends, while only 17.9% got loan to finance the production. This implied that some respondent in the study area start to embrace change by getting loan to boost tomato production. The Table further revealed that about 36% of the respondents owned the land through inheritance, while 21% obtained the land through direct purchase. 28% rented the land, while about 15% of the respondent acquired the land as a gift.
It can be further seen that, 41.8% of the respondents in the area cultivated tomato on an area between 0.1-1.0ha and 40.3% of the respondents have a farmland of 1.1-2.0ha for tomato production while only 17% of the respondents cultivate a tomato on an area above 2ha. This revealed that most of the farmers in the area had small holding since they did not have adequate funds to purchase large farm size for production

Labor is one of areas in which most farmers tend to incur cost during production. For this reason the sources and the cost to the farmer is a vital instrument of measuring farm performance. Table 2 shows that 35.8% of the respondents in the study area resorted to the use of hired labor, only 19.5% of the respondents used family labor solely. While 44.8% of respondents used both family and hired labor. This means that more funds are spend on the hired labor than on the family

Cost of Tomato production (₦/ha)
Table 2 showed that 18% of the farmers spent less than N150, 000 on production of between 0.1-1.0ha, 24% spent between N 150,000-250,000 on production of between, 1.1-2.0ha, while 58% spend more than N 250, 000 as production cost on farms greater than 2ha.

Table 2: Distribution of the respondents according to Cost of Production (N/ ha)

Estimated Cost (N)	Frequency	Percentage
<150,000	12	18
150,000 - 250,000	16	24.
>250,000	39	58.
Total	**67**	**100**

Source: Field Survey (2018)

Cost and Returns of Tomato Production

Table 3: Cost and Return of Tomato Production (₦/ha)

Items of Cost	Value (₦/ha)	Percentage (%)
Seeds/Seedlings	6,277.9	2.8
Labor	29,110.6	13.1
Fertilizer	88,649.0	39.8
Pesticides	13,223.8	5.9
Transport	27,459.1	**12.3**
Total variable cost	**164,720.4**	
Fixed cost		
Land	5, 0721.1	22.8
Implements	7,390.61	3.3
Total fixed cost	**58,111.71**	**100**
Total cost = (TVC+TFC) =	**222,832.11**	
Returns	**Value**	**Percentage %**
Sales	313,192.3	94.3
Consumption	9,112.3	2.9
Gifts	9,131.6	2.8
Total (GI)	**331,376.2**	**100**

Source: Field Survey (2018)

Gross margin (GI – TVC) =₦166, 655.8
Net farm income (GI – TC) = ₦108, 544.1
Return per Naira invested (GI /TC) = 1.5
Operating ration OR = (TVC/TR) = 0.49
Fixed ratio FR = TFC/TR = 0.18
Gross ratio GR (TC/TR) = 0.67

Table 3 showed that fertilizer constituted the largest part of the variable cost with 39.8% then followed by labor, transport, pesticide and seed/seedlings with 13.1%, 12.3%, 5.9% and 2.8% respectively. Land dominated the fixed cost 22.8% and implements with 3.3%. The value of gift constituted the smallest percentage of income with 2.8%, home consumption had 2.9 and major output comes from the sales of the crop and its related product which constituted 94.3%. Thus, it could be safe to say that tomato is produced in the area as a cash crop. The gross margin was ₦166, 655.8, Net farm income was ₦108, 544.0 and return per naira invested was N 1.5. Other financial measures included are operating ratio, fixed ratio and gross ratio with 0.02, 0.17 and 0.67 respectively. These results revealed that tomato production in the study area was profitable despites production constraints encountered by the farmers.

Production Function Estimates

The relationship between the output produced and the input involved in the production was estimated using multiple regression analysis and the result is presented in Table 5

Table 4: Regression statistics of Tomato production

Variables	Coefficient		T-Value	Sig	
Constant (b$_o$)		1.969		2.896	0.005
log_Farmsize (X$_1$)	0.353		2.190	0.032**	
log_Seed (X$_2$)		0.048		0.909	0.367 ^{NS}
log_labor cost	(X$_3$)	0.178		2.240	0.029**
log_Pesticide	(X$_4$)	-0.049		-0.317	0.753^{NS}
log_Fertilizer	(X$_5$)	0.524		3.624	0.001***
R^2		0.675			
F =		25.294			

Source: Field Survey 2018, ***Significant at 1%, **Significant at 5%, NS – Not significant

F-estimated value measures the joint significance of all the explanatory variables and was found to be 25.294 and significant at 1% probability level, this implied that the explanatory variables included in the model havea strong relationship with the dependent variable.

The regression analysis revealed a coefficient of determinations (R^2) of 67.5%, meaning that the estimated variables used in the model explained 67.5% of the variation in tomato production in the study area.

Farm size and Labor were positive and significantly influenced production at 5% level while fertilizer had a significant influence at 1% level. This implied that a unit increase in Farm size, labor cost and fertilizer will lead to an increased in tomato output by 0.353, 0.178 and 0.524 respectively.

Problems of Tomato Production

Table 5: Constraints to Tomato Production

Problems	Frequency	Percentage (%)	Ranking
Climatic factors	27	40.2	1st
Inadequate capitals 20	29.9	2nd	
High pest and disease	15	22.4	3rd
Other factors	5	7.4	4th
Total	**67**	**100**	

Source: Field Survey (2018)

Table 6 showed that climatic factors (such as erosion etc) are ranked 1st as major problem which constituted 40.2%, inadequate capital was ranked 2nd with 29.9%. This is because majority of the farmers have no access to loan but solely depend on personal saving to fund the enterprises. Pest and diseases are ranked as the 3rd constraints faced by the farmers with 22.4%. Other constraints included are poor management high cost of fertilizer, insecticides, pesticides, and marketing of the produce constituted 7.4%.

Conclusion and Recommendations

Tomato production in Fagge local government area of Kano state was being carried out by males only. The tomato famers in the area were relatively young with relatively low level of education. There was insufficient capital among other problems that could be used to expand production. It can therefore be concluded that tomato production in the study area was profitable despite constraints encountered by the farmers.

In view of the identified constraints under which production was still profitable, constraints of tomato production can be ameliorated through formulating and implementing policies aimed at reducing the cost of inputs and making credit facilities available and affordable to the tomato farmers and should be encouraged to form cooperative societies.

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